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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/828,924	04/10/2001	Baozong Zhao	1781-0221P	6648

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EXAMINER

VIJAYAKUMAR, KALLAMBELLA M

ART UNIT	PAPER NUMBER
1751	7

DATE MAILED: 05/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/828,924	ZHAO ET AL.
	Examiner	Art Unit
	Kallambella Vijayakumar	1751

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-8 and 10-26 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-8, 10-15, 17-21 and 23-26 is/are rejected.
- 7) Claim(s) 16 and 22 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 1 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____.
2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.	6) <input type="checkbox"/> Other: _____.

DETAILED ACTION

- Applicant's election without traverse of Group-I, Claims 1-8 and 10-26 and canceling of Claim-9 in Paper No. 6 dated 03/14/2003 in response to restriction requirement in Paper-5 dated 02/12/2003 is acknowledged.
- Claims 1-8 and 10-26 are currently pending with the application.
- Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Singapore with Application No 20002026-3 on 04/11/2000. It is noted, however, that applicant has not filed a certified copy of the foreign application as required by 35 U.S.C. 119(b). In order to perfect such a claim, the applicant is urged to file a certified copy of the said application.
- The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
- The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A (1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the examiner on form PTO-892 has cited the references, they have not been considered.

Specification

The abstract of the disclosure is objected to because it has two paragraphs, and the abstract should be in narrative form and generally limited to a single paragraph within the range of 50 to 150 words. The abstract should not exceed 25 lines of text. See MPEP § 608.01(b).

Claim Objections

- Claims 16 and 22 are objected to because of the following informalities: As dependent upon the rejected base claim/s.
 - Claims 16 and 22 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- Claims 23-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- Claims 23-25 recite the limitation "a method according to" in Lines-1. There is insufficient antecedent basis for this limitation in the claim.
- Regarding claim 18, the phrase "sufficient" in Line-7 renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "sufficient"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d). Neither the claim nor the specification provide guidance how much time is encompassed by the phrase "sufficient" thereby rendering the claim indefinite and the public will not be able to make use of the invention without the burden of undue experimentation.
- Regarding claim 25, the phrase "type" in Line-1 renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "type"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d). Neither the claim nor the specification provide guidance in what materials are included and what materials are excluded by the phase "type" and public will not be able to make use of the invention without the burden of undue experimentation and without violating the boundaries of the claims.
- Regarding claim 26, the phrase "whenever" in Line-1 renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "whenever"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d). It is suggested to delete the word "whenever" from the claim.
- The examiner construes the claims 23 and 25 to be dependent on Claim-18 for the purposes of examination.

Claim Rejections - 35 USC § 102
Claim Rejections - 35 USC § 103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

- Claims 1, 8, 10-15, 17-18, 21 and 26 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Natsuko et al (JP 07-301828).
 - Natsuko et al disclose a low voltage electrochromic element capable of low haze comprising of a film of polymers such as polyolefin or PTFE whose pores are infiltrated by a solution or a dispersion of a viologen derivative in a solvent. Natsuko et al further disclose treating the polymer film with a solution or a sol of the viologen derivative by spraying it over the polymer film followed by drying. The increase in the electrical conductivity of the polymer film treated with an electrolyte solution of viologen/derivative would be inherent. The solid ion conductivity values for the polymer film of $1.5-2.5 \times 10^{-4}$ S/cm would meet the resistance/conductivity limitation of the instant claims- 1, 17-18. Natsuko et al further disclose the replacement of the two terminal groups on the heptyl-viologen with halogens for treating the polymer film would meet the limitation of dihalide derivatives of viologen in claims 16 and 22. The presence of viologen in monomeric/polymeric form would be inherent. The sufficient time needed for the treatment of the polymer substrate film with viologen solution would be inherently anticipated by the choice of design parameters (Abstract, Section: 0010,0011, 0015, 0023, 0026, 0029). All the limitations of the claims are met.
 - The reference is anticipatory.
 - In the alternative that the disclosure by Natsuko et al be insufficient to arrive at the limitations of the instant claims by the applicants, it would have been obvious for a person of ordinary skill in the art to use other halogen derivatives of viologen to derive the benefits of such an incorporation per the disclosure of Natsuko, make necessary

modifications to the composition and/or process by the choice of design with reasonable expectation of success.

- Claims 1, 8, 15, 18 and 26 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kumiko et al (JP 06-102540).
 - Kumiko et al disclose an electrochromic element capable of displaying multiple colors comprising of thin film of polymers such as a polyolefin or PTFE whose pores are filled with an electrolyte solution of a viologen derivative dissolved in a solvent containing polyethylene oxide. Kumiko et al further disclose treating a polymer film with a spray of a solution or a sol of the viologen derivative over the surface body of the film and allowing the pores of the polymer film to be infiltrated with the solution followed by drying. The increase in the electrical conductivity of the polymer film treated with an electrolyte solution of viologen would be inherent as shown by Natsuko et al and such a treatment would meet the limitations of instant claims 1 and 18. The presence of viologen in either monomeric form or polymeric form would be inherent. The sufficient time needed for the completion of the treatment of polymer film with viologen solution would be inherently anticipated by the choice of design parameters (Abstract, Section: 0004, 0009, 0015). All the limitations of the claims are met.
 - The reference is anticipatory.
 - In the alternative that the disclosure by Kumiko et al be insufficient to arrive at the limitations of the instant claims by the applicants, it would have been obvious for a

person of ordinary skill in the art to make modifications to the composition and/or process by the choice of design with reasonable expectation of success.

- Claims 1-6, 8, 10-15, 17-18, 20-21, 23-24 and 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Natsuko et al (JP 07-301828) in view of Hidetsugu et al (JP 01-230691) or Sekisui (JP 03-152183).
 - The disclosure by Natsuko et al on the electrochromic element comprising of a viologen-treated polymer film is set forth as above.
 - Natsuko et al do not disclose the use of aqueous solutions of viologens to treat the porous polymer film or the use of polyaniline or polypyrrole polymer as substrate.
 - Hidetsugu et al disclose an electrochromic display element formed using an aqueous solution of polymer gel containing a viologen derivative with a halogenated vinyl compound such as vinyl monochloroacetate and its benefit in generating color uniformity in situations having vibration (Abstract).
 - Sekisui discloses an electrochromic element comprising a coloring layer consisting of more than two electrochromic materials comprising of various porphorins including viologens and conductive polymers such as polyaniline and polypyrrole that could realize a halftone and a shade of color replacing liquid crystals (Abstract).
 - Natsuko et al make a composite polymer film treated with a solution or sol of viologen derivative in making the electrochromic element. In the analogous art of electrochromic display unit Hidetsugu et al discloses the advantages of using viologen derivatives with

halogenated vinyl compounds, and Sekisui further teaches benefits of using viologens in combination with polyaniline/polypyrrole as an organic electrochromic components. It would have been obvious for a person of ordinary skill in the art to substitute the viologens of Natsuko with viologens of either Hidetsugu et al or Sekisui to improve upon by deriving benefits of such incorporation in the formulation of the electrochromic element, and make any necessary modifications in composition and/or process by the choice of design to arrive at the limitations of the instant claims with reasonable degree of success.

- Claims 1, 8 and 15, rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sammells (US Patent # 4,750,817).
 - Sammells discloses a multicolor electrochromic cell with a solid polymer electrolyte comprising of a polymer in association with a water-soluble organic electrochromic material, and a supporting electrolyte was incorporated to reduce the internal resistance of the cell. Sammells further discloses the use of either aqueous or organic solutions viologens in the formulation of electrochromic cells (Col-2, Lines: 12-14; Col-3, Lines: 1-23). The alkylviologens such as heptylviologens were among the preferred organic electrochromic materials, while preferred polymers had a functional group bound to the molecule or an ionically conducting polymer to provide the solid state electrolyte (Col-4, Lines: 41-45, 54-55, 62-65). The presence of viologen in monomeric/polymeric form would be inherent. The sufficient time needed for the treatment of substrate film by the

viologen solution would be inherently anticipated by the design parameters. All the limitations of the claims are met.

- The reference is anticipatory.
- In the alternative that the disclosure by Sammells be insufficient to arrive at the limitations of the instant claims by the applicants, it would have been obvious for a person of ordinary skill in the art to make necessary modifications to the composition and/or process by the choice of design with reasonable expectation of success.
- Claims 1-8, 10-15, 17-21, and 24-26 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Allemand et al (US Patent # 5,989,717).
 - Allemand et al disclose electrochromic devices having an electrochemical active layer of polyaniline or a polyaniline derivative and an electrolyte containing a viologen salt (col-4, Lines: 13-15). Allemand further discloses coating a film of polymer film such as polyaniline or polypyrroles over a substrate from a liquid mixture and optionally exposing to a temperature or radiation as desired. The polymer film would be in contact with an electrolyte comprising of red-ox active material such as a viologen salt in a solvent and this would meet the limitation treatment of a polymer film with viologen per the limitations of the instant claims 1 and 18 (Col-5, Lines: 60-61, Col-8, Lines: 63-64, Col-9, Lines: 25-30). Allemand further disclose the heat treatment of polyaniline film from room temperature to 100°C under ambient conditions and the presence of

leucoemardine and emardine phases by virtue of the oxidation states for polyaniline. The processing parameters such as temperature, time, atmosphere would be inherently anticipated by the choice of design (Col-13, Lines: 6-9; Col-14, lines 61-65). Allemand et al further disclose the filling of the cells with an electrolyte comprising of ethyl viologen diperchlorate, lithium perchlorate, and the inherent modification of the conductivity of the polyaniline film by the viologen salt in contact with the polymer would meet the instant claim limitations in claims 1, 17 and 18. The presence of viologen in monomeric/polymeric form would be inherent. All the limitations of the claims are met.

- The reference is anticipatory.
- In the alternative that the disclosure by Allemand et al be insufficient to arrive at the limitations of the instant claims by the applicants, it would have been obvious for a person of ordinary skill in the art to make modifications to the composition and/or process by the choice of design with reasonable expectation of success.
- Claims 1-8, 10-15, 17-21 and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Sammells et al or Allemand et al (US Patent # 5,989,717) in view of Yu et al(US Patent # 5,471,338).
 - The disclosures by Sammells and Allemand et al on the treatment of polymer with viologen/derivative and the formulation of the electrochromic element are set forth as above.
 - Sammells do not disclose the specific use of viologen dihalides as the electrochromic components.

- Allemand et al does not disclose the use of aqueous solutions of viologens being in contact with the polymer film.
- Yu et al disclose the use of polyaniline and viologens such as 1,1-diheptyl-4,4-bipyridinium dibromide as organic electrochromic materials in fabricating electrochromic device with a plastic substrate (Col-9, Lines: 11-15).
- Sammells teaches fabricating a multicolor electrochromic cell comprising an ion conductive polymer in contact with electrolyte containing a viologen compound that is an electrochromic material and its benefits. In the analogous art, Allemand et al teach an electrochromic device comprising of polyaniline/polypyrrole in contact with an electrolyte comprising of halogen containing viologen salts as electrochromic material and its advantages. It would be obvious for a person of ordinary skill in the art to substitute the viologens of either Sammell or Allemand with the viologen dihalide derivative of Yu et al to benefit from such a modification, make necessary changes in the composition and/or process by choice of design with expectation of reasonable success in arriving at the limitations of the instant claims by the applicants.

Allowable Subject Matter

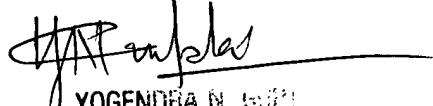
The following is a statement of reasons for the indication of allowable subject matter:

Claims 16 and 22 would allowable upon overcoming the objections. The prior art of record neither teaches nor suggestive of the benzyl viologen dichloride and poly(butylviologen dibromide) modifying the polymers per the limitations of the instant claims including the limitations of the base claim and any intervening claims.

Conclusion

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- Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 703-305-4931. The examiner can normally be reached on M-Th, 07:00 - 15.30 hrs, Fri: 05.30-14.00.
- If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 703-308-4708. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3599 for regular communications and 703-305-3599 for After Final communications.
- Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

kmv
May 15, 2003



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